

# HP StorageWorks

## Modular Smart Array 20

### User Guide



March 2004 (First Edition)  
Part Number 347918-001

© Copyright 2004 Hewlett-Packard Development Company, L.P.

The information contained herein is subject to change without notice. The only warranties for HP products and services are set forth in the express warranty statements accompanying such products and services. Nothing herein should be construed as constituting an additional warranty. HP shall not be liable for technical or editorial errors or omissions contained herein.

HP StorageWorks Modular Smart Array 20 User Guide

March 2004 (First Edition)

Part Number 347918-001

---

# **Contents**

## **About This Guide**

Audience Assumptions .....	vii
Important Safety Information .....	vii
Symbols on Equipment .....	vii
Symbols in Text.....	ix
Getting Help .....	ix
Technical Support.....	ix
HP Website .....	x
Authorized Reseller .....	x
Reader's Comments .....	x

## **Chapter 1** **Enclosure Features**

## **Chapter 2** **Identifying the Enclosure Components**

Enclosure .....	2-1
Power Supply Unit .....	2-3
Controller Module .....	2-4
Drive and Drive Blank .....	2-5
Fan Assembly .....	2-7

## **Chapter 3** **Installing the Enclosure in a Rack**

Preparing the Rack .....	3-1
Removing the Enclosure Components .....	3-1
Mounting the Enclosure in the Rack .....	3-2

Completing the Installation.....	3-7
----------------------------------	-----

## **Chapter 4**

### **Configuring the Enclosure Drives**

## **Chapter 5**

### **Replacing Enclosure Components**

Replacement Procedures .....	5-1
Disk Drive or Drive Blank .....	5-2
Fan Assembly .....	5-3
Power Supply Unit .....	5-3
Controller Module .....	5-3
Battery Packs (in the Controller Module) .....	5-4

## **Appendix A**

### **Regulatory Compliance Notices**

Federal Communications Commission Notice .....	A-1
Class A Equipment.....	A-2
Class B Equipment .....	A-2
Declaration of Conformity for Products Marked with the FCC Logo, United States Only.....	A-3
Modifications .....	A-3
Cables .....	A-3
Canadian Notice (Avis Canadien) .....	A-4
Class A Equipment.....	A-4
Class B Equipment .....	A-4
European Union Notice .....	A-4
Japanese Notice.....	A-5
Korean Notices .....	A-5
BSMI Notice .....	A-6
Battery Replacement Notice .....	A-6

## **Appendix B**

### **Electrostatic Discharge**

Preventing Electrostatic Damage.....	B-1
Grounding Methods to Prevent Electrostatic Damage.....	B-2

## **Appendix C**

### **Specifications**

Physical Specifications .....	C-1
Power Specifications .....	C-2
Environmental Specifications.....	C-2

## **Index**



---

## About This Guide

This guide provides step-by-step instructions for installation and reference information for operation of the HP StorageWorks Modular Smart Array 20 disk drive enclosure.

### Audience Assumptions

This guide is for the person who installs, administers, and troubleshoots servers. HP assumes you are qualified in the servicing of computer equipment and trained in recognizing hazards in products with hazardous energy levels.

### ⚠ Important Safety Information

Before installing this product, read the *Important Safety Information* document included with the server.

### Symbols on Equipment

The following symbols may be placed on equipment to indicate the presence of potentially hazardous conditions:



**WARNING:** This symbol, in conjunction with any of the following symbols, indicates the presence of a potential hazard. The potential for injury exists if warnings are not observed. Consult your documentation for specific details.

---



This symbol indicates the presence of hazardous energy circuits or electric shock hazards. Refer all servicing to qualified personnel.

**WARNING:** To reduce the risk of injury from electric shock hazards, do not open this enclosure. Refer all maintenance, upgrades, and servicing to qualified personnel.

---



This symbol indicates the presence of electric shock hazards. The area contains no user or field serviceable parts. Do not open for any reason.

**WARNING:** To reduce the risk of injury from electric shock hazards, do not open this enclosure.

---



This symbol on an RJ-45 receptacle indicates a network interface connection.

**WARNING:** To reduce the risk of electric shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into this receptacle.

---



This symbol indicates the presence of a hot surface or hot component. If this surface is contacted, the potential for injury exists.

**WARNING:** To reduce the risk of injury from a hot component, allow the surface to cool before touching.

---



These symbols, on power supplies or systems, indicate that the equipment is supplied by multiple sources of power.

**WARNING:** To reduce the risk of injury from electric shock, remove all power cords to completely disconnect power from the system.

---



This symbol indicates that the component exceeds the recommended weight for one individual to handle safely.

Weight in kg  
Weight in lb

**WARNING:** To reduce the risk of personal injury or damage to the equipment, observe local occupational health and safety requirements and guidelines for manual material handling.

---

## Symbols in Text

These symbols may be found in the text of this guide. They have the following meanings.



**WARNING:** Text set off in this manner indicates that failure to follow directions in the warning could result in bodily harm or loss of life.

---



**CAUTION:** Text set off in this manner indicates that failure to follow directions could result in damage to equipment or loss of information.

---

**IMPORTANT:** Text set off in this manner presents essential information to explain a concept or complete a task.

**NOTE:** Text set off in this manner presents additional information to emphasize or supplement important points of the main text.

## Getting Help

If you have a problem and have exhausted the information in this guide, you can get further information and other help in the following locations.

### Technical Support

In North America, call the HP Technical Support Phone Center at 1-800-652-6672. This service is available 24 hours a day, 7 days a week. For continuous quality improvement, calls may be recorded or monitored. Outside North America, call the nearest HP Technical Support Phone Center. Telephone numbers for worldwide Technical Support Centers are listed on the HP website, <http://www.hp.com>.

Be sure to have the following information available before you call HP:

- Technical support registration number (if applicable)
- Product serial number

- Product model name and number
- Applicable error messages
- Add-on boards or hardware
- Third-party hardware or software
- Operating system type and revision level

## **HP Website**

The HP website has information on this product as well as the latest drivers and flash ROM images. You can access the HP website at <http://www.hp.com>.

## **Authorized Reseller**

For the name of your nearest authorized reseller:

- In the United States, call 1-800-345-1518.
- In Canada, call 1-800-263-5868.
- Elsewhere, see the HP website for locations and telephone numbers.

## **Reader's Comments**

HP welcomes your comments on this guide. Send your comments and suggestions to [ServerDocumentation@hp.com](mailto:ServerDocumentation@hp.com).

---

## Enclosure Features

The HP StorageWorks Modular Smart Array 20 (MSA20) is an Ultra320 host connect disk drive enclosure that uses Serial ATA (SATA) drives. The MSA20 delivers a low-cost, high-capacity solution that is suitable for minimum I/O workload situations such as storing reference data, archiving files, and performing disk-to-disk backups.

You can connect the MSA20 to the external port of any sixth-generation Smart Array controller or to an MSA1500 controller shelf (MSA1500 cs). These external controllers enable you to configure the SATA drives in the MSA20 with RAID levels of 0, 1+0, 5, or ADG.

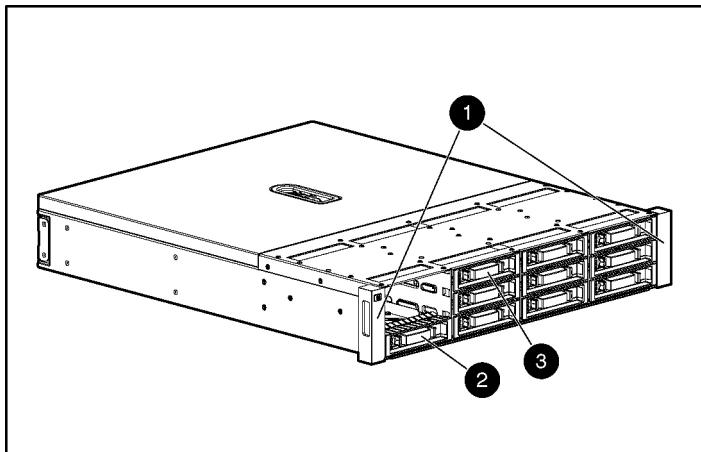
The MSA20 also has an internal controller module with a battery-backed write cache. The cache allows data to be transferred rapidly to the SATA drives, and the battery-backed feature protects data held in the cache for up to four days if power to the enclosure is interrupted.

The enclosure components incorporate some important safety and redundancy features. For example, if one power supply unit fails, the remaining functional unit can temporarily provide enough power for a fully equipped enclosure. Similarly, if one fan fails, the remaining fan runs at a faster speed, and can temporarily provide enough cooling for a fully equipped enclosure. In either case, replace the failed component as soon as possible to maximize the life expectancy of the remaining power supply or fan.

For more information about features of the MSA20 enclosure, refer to the HP website, <http://www.hp.com>.

## Identifying the Enclosure Components

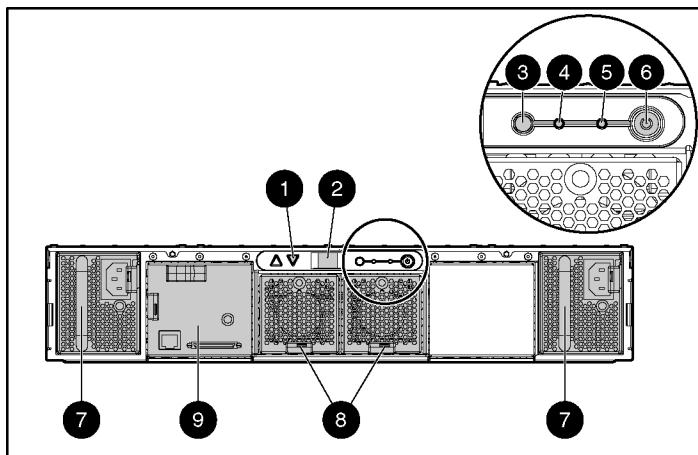
### Enclosure



**Figure 2-1: Enclosure, front view**

Item	Description
1	Mounting bracket covers (bezel ears)
2	Drive blank in bay 3
3	Drive blank in bay 4

**Note:** The enclosure is shipped with 10 drive blanks. Insert blanks into unused drive bays in a working enclosure so that the correct enclosure airflow is maintained.



**Figure 2-2: Enclosure, rear view**

Item	Description
1	Arrow buttons (for future use)
2	Enclosure ID display—Indicates the box ID number assigned to the enclosure during drive configuration
3	Unit identification button—Causes the blue LED on all drives in the enclosure to be illuminated
4	Enclosure Monitor status LED—Glow green to indicate that the enclosure monitor (Global Service Indicator, or GSI) is functional
5	Enclosure fault LED—Glow amber when any other LED in the enclosure is amber, if the GSI is functional
6	Enclosure power button
7	Power supply units
8	Fan assemblies
9	Controller module



**WARNING:** Do not use the handles on the power supply units to lift or hold the enclosure. These handles are designed only for holding the power supply units or removing them from the enclosure, not for supporting the weight of the enclosure.

## Power Supply Unit

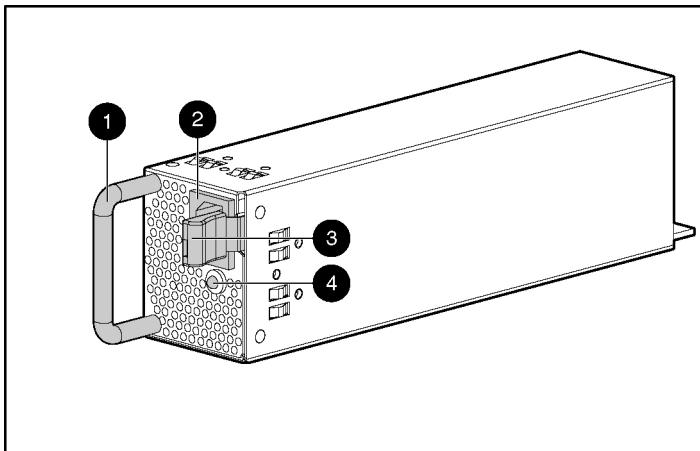


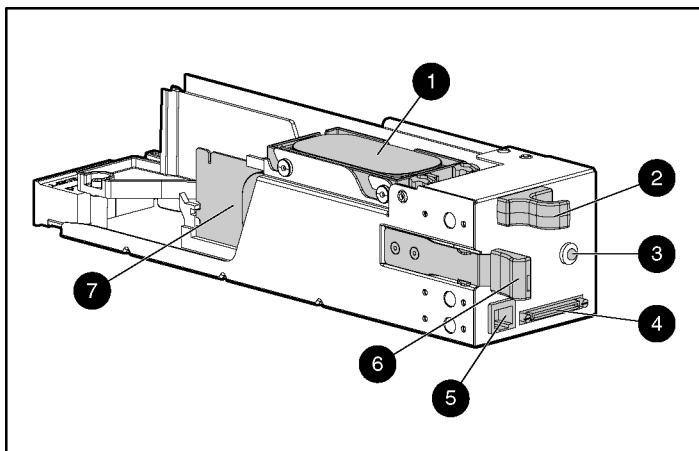
Figure 2-3: Power supply unit

Item	Description
1	Handle
2	AC power inlet
3	Release lever
4	Bicolor status LED (green or amber)



**WARNING:** Do not use the handles on the power supply units to lift or hold the enclosure. These handles are designed only for holding the power supply units or removing them from the enclosure, not for supporting the weight of the enclosure.

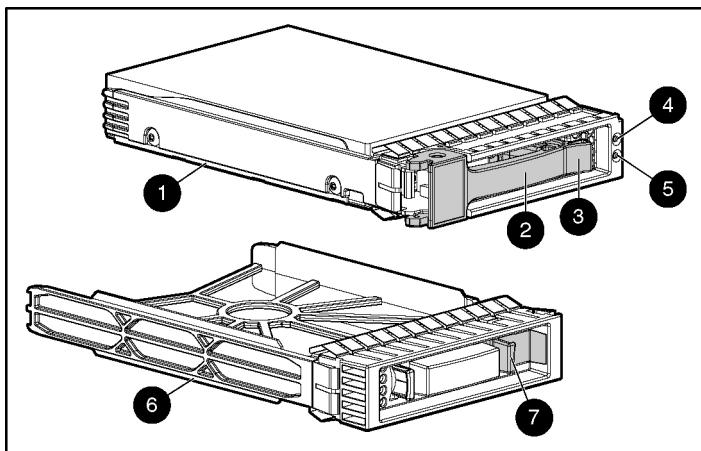
## Controller Module



**Figure 2-4: Controller module**

Item	Description
1	Upper cache battery
2	Finger hook
3	Bicolor status LED (green or amber)
4	VHDCI connector (for connecting to a sixth-generation Smart Array controller or an MSA1500 cs enclosure)
5	Service port (for HP service technicians only)
6	Release lever
7	Controller cache (lower cache battery just visible)

## Drive and Drive Blank



**Figure 2-5: Drive (in carrier) and drive blank**

Item	Description
1	Drive carrier
2	Release lever
3	Release button
4	Fault/ID bicolor LED (amber or blue)
5	Online LED (green)
6	Drive blank
7	Release latch

The blue ID LED illuminates when you press the unit identification button on the rear of the enclosure. This LED also illuminates when the drive or an array containing the drive is selected in a management application such as the HP Array Configuration Utility (ACU).

The amber LED on a drive illuminates when the drive has failed or is predicted to fail in the near future.

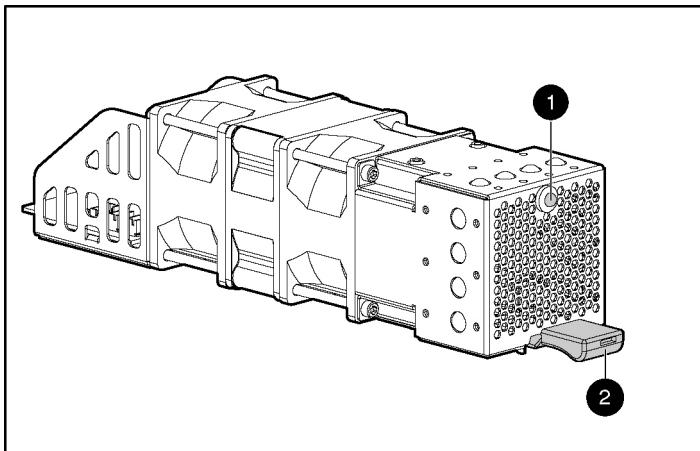
For more information about the meaning of the various hard drive LED illumination patterns, refer to Table 2-1.

**Table 2-1: Interpreting the Drive Status LEDs**

Online LED (green)	Fault/ID LED (amber/blue)	Meaning
On, off, or flashing	Alternating between amber and blue	The drive has failed, or a predictive failure alert* has been received for this drive. It has also been selected by a management application.
On, off, or flashing	Steadily blue	The drive is operating normally, and it has been selected by a management application.
On	Amber, flashing regularly (1 Hz)	A predictive failure alert* has been received for this drive. Replace the drive as soon as possible.
On	Off	The drive is online, but it is not currently active.
Flashing regularly (1 Hz)	Amber, flashing regularly (1 Hz)	The drive is part of an array that is undergoing capacity expansion or stripe migration, but a predictive failure alert* has been received for this drive. To minimize the risk of data loss, do not replace the drive until the expansion or migration is complete.
Flashing regularly (1 Hz)	Off	The drive is rebuilding, or it is part of an array that is undergoing capacity expansion or stripe migration.
Flashing irregularly	Amber, flashing regularly (1 Hz)	The drive is active, but a predictive failure alert* has been received for this drive. Replace the drive as soon as possible.
Flashing irregularly	Off	The drive is active, and it is operating normally.
Off	Steadily amber	A critical fault condition has been identified for this drive, and the controller has placed it offline. Replace the drive as soon as possible.
Off	Amber, flashing regularly (1 Hz)	A predictive failure alert* has been received for this drive. Replace the drive as soon as possible.
Off	Off	The drive is either offline, a spare, or not configured as part of an array.

\*Predictive failure alerts can occur only when the MSA20 is connected to a Smart Array controller. For information about interpreting the drive fault LED when the MSA20 is connected to an MSA1500 cs, refer to the release notes at <http://www.hp.com/go/msa1500cs>.

## Fan Assembly



**Figure 2-6: Fan assembly**

Item	Description
1	Bicolor status LED (green or amber)
2	Release lever

## Installing the Enclosure in a Rack

Installing the enclosure in a rack involves four steps:

- Preparing the rack
- Removing the enclosure components to make the enclosure more manageable
- Mounting the enclosure in the rack
- Completing the installation process (reinstalling the components and connecting the power)

### Preparing the Rack

The racks that HP supports for use with the MSA20 enclosure are the HP System E racks and the HP 10000 Series racks. Other racks might also be suitable, but have not been tested with the MSA20.

For information about setting up a rack, including appropriate warnings and cautions, refer to the relevant rack user guide.

Before mounting the enclosure in a rack, confirm that the rack location meets the environmental requirements for the enclosure as described in Appendix C.

### Removing the Enclosure Components

**IMPORTANT:** The following abbreviated instructions are appropriate for removing the components from an enclosure that is not being used. To remove individual components from a working enclosure, refer to the complete instructions in Chapter 5.

- **Controller module**—Squeeze the finger hook and the release lever together while pulling the module out of the enclosure.
- **Disk drive**—Press the release button, and then pull the release lever to remove the drive from the enclosure.
- **Drive blank**—Squeeze the release latch while pulling the drive blank out of the enclosure.
- **Fan assembly**—Lift the release lever upward while pulling it to remove the fan assembly from the enclosure.
- **Power supply unit**—Squeeze the handle and the release lever together while pulling the unit out of the enclosure.

## Mounting the Enclosure in the Rack



**WARNING: Use at least two people to move or install the enclosure. For greater safety and easier installation, reduce the enclosure weight by removing the disk drives, power supply units, controller module, and fan assemblies.**

**9 kg (20 lb) empty**

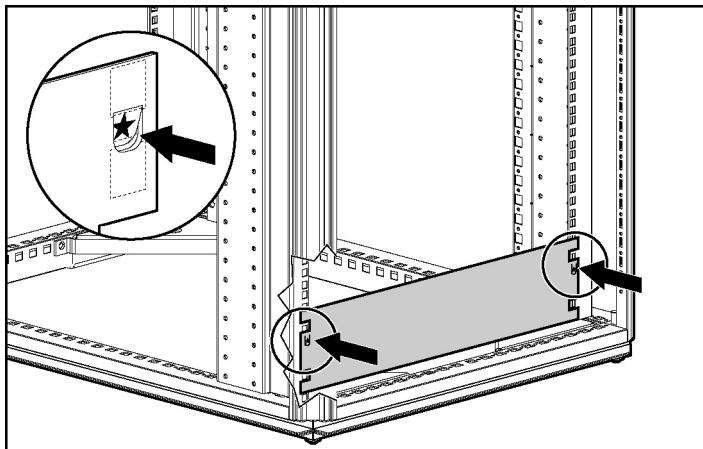
**24 kg (53 lb) full**

---

Each enclosure requires a vertical rack space of 2U (equivalent to 89 mm, or 3.5 inches).

1. Use the rack mounting template as a guide to indicate where on the rack the rails for the enclosure are to be mounted.
  - a. At the front of the rack, with the front of the template facing you, align the lower edge of the template with the bottom of the rack (or the top of the previous rack component). Be sure that the lower edge of the template is level.

- b. Push the template tabs into the holes in the rack uprights to hold the template in place.



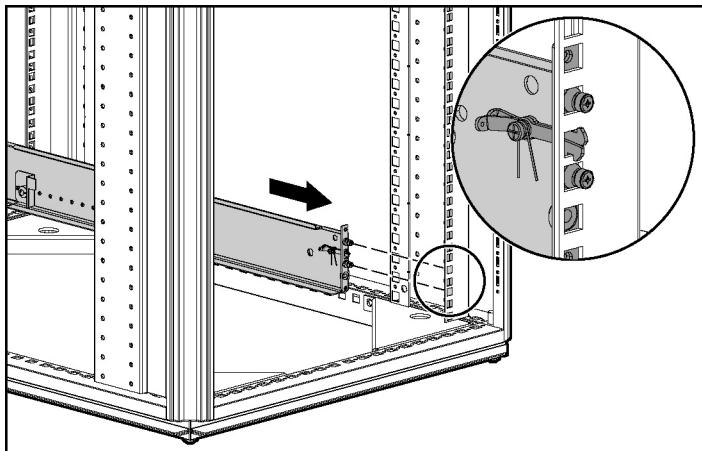
- c. Use a permanent marker pen to indicate the holes in the rack uprights into which the scissor-like locking latches are to be inserted, as specified by the template.
- d. Repeat these steps to mark the back of the rack, using the information on the back of the template as a guide to the required location of the locking latches in this case.
2. If the holes in the rack uprights are round instead of square, remove the standard pins from the rails and replace them with the round-hole pins provided in the rack mounting hardware kit.



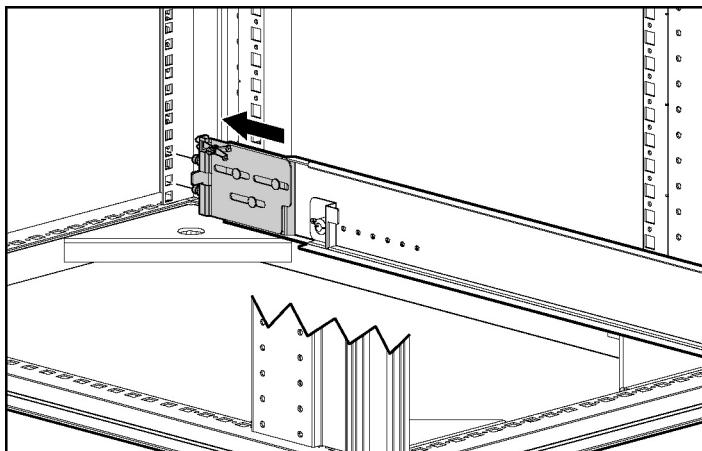
**WARNING: The pins in the rails are load-bearing. Do not remove the pins except to replace them with the pins for round-hole racks.**

3. Identify the left (L) and right (R) rack rails by markings stamped into the rails.

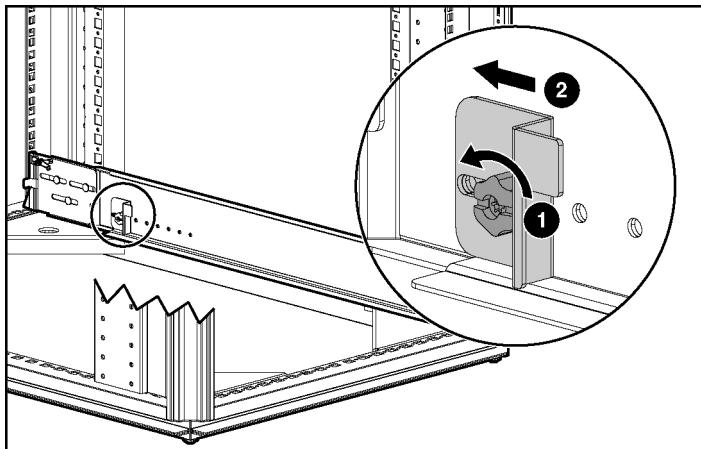
4. Slide the front end of the right rack rail toward the inside front of the rack until the locking latch engages with the marked hole in the front rack upright.



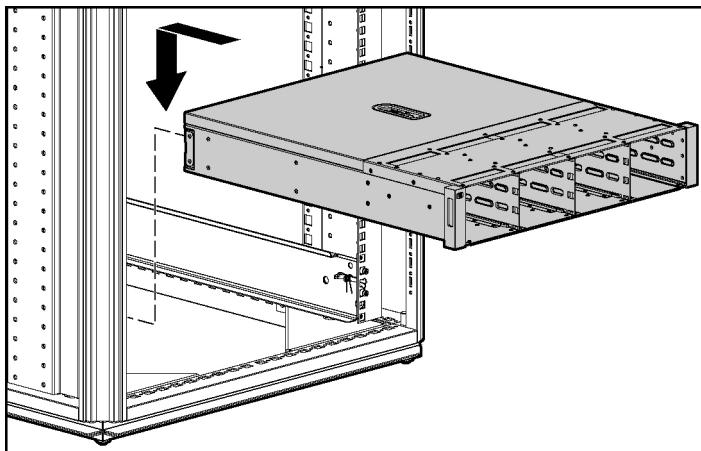
5. Extend the back end of the rail toward the inside rear of the rack until the locking latch engages with the marked hole in the rear rack upright.



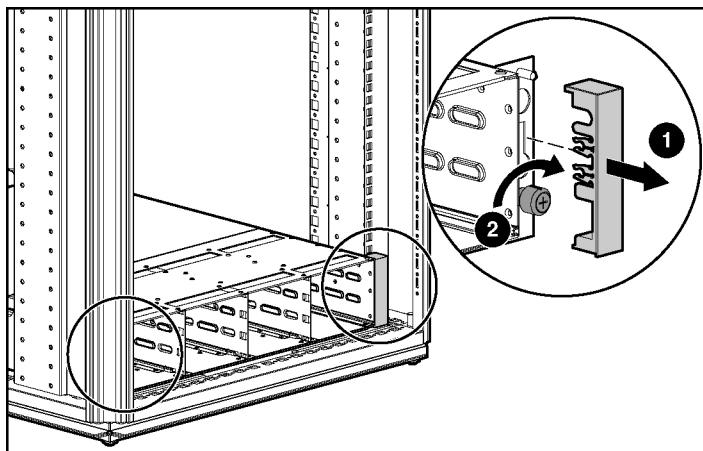
6. Loosen the locknut on the shipping bracket (1), and move the bracket to the rearmost position on the rail (2).



7. Repeat steps 4 through 6 for the left rack rail.
8. Align the enclosure with the rails, and slide it into the rack.

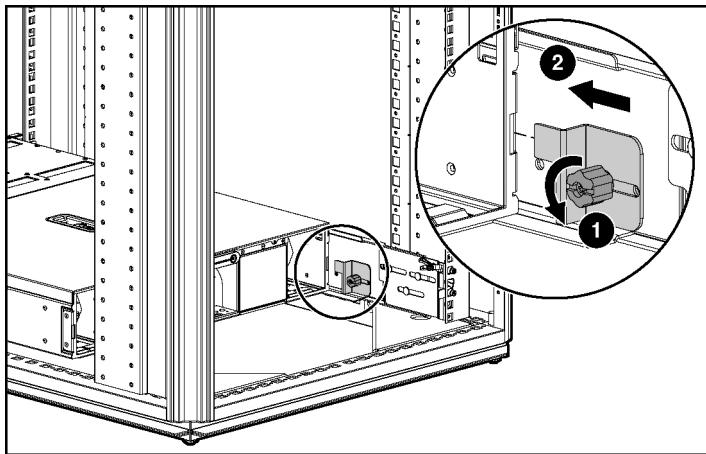


9. Remove the mounting bracket covers (1), and tighten the thumbscrews to secure the enclosure to the rack (2).



10. Replace the mounting bracket covers.
11. If you intend to move the rack while the enclosure is installed, adjust the shipping brackets on each rail to secure the enclosure to the rack.
  - a. Loosen the shipping bracket locknut (1).

- b. Slide the bracket forward until it engages with the enclosure chassis (2).



- c. Tighten the locknut.
- d. Repeat this procedure for the other rail.

## Completing the Installation

1. Reinstall the components in the enclosure. For details, refer to Chapter 5.
2. Connect the VHDCI connector on the controller module to the output of an MSA1500 cs or to the external connector of a sixth-generation Smart Array controller in a server.
3. Connect the AC input socket of each power supply unit to separate AC power sources.
4. Press the enclosure power button on the rear of the unit.
5. Confirm that the enclosure components are all functioning normally by observing the condition of their status LEDs, which should all be green. If the amber LED on any component is illuminated, the component needs attention for one of these reasons:
  - It has suffered a critical fault.
  - It is not seated properly in the enclosure.

- In the case of a drive, it is predicted to fail in the near future (assuming that it is seated properly in the enclosure).
- In the case of a power supply, it is not plugged in.

---

## Configuring the Enclosure Drives

The following tools are available for configuring the drives in an MSA20 enclosure:

- The HP Array Configuration Utility (ACU)—A versatile, browser-based utility that provides you with maximum control over the configuration parameters
- The HP Option ROM Configuration for Arrays utility (ORCA)—A simple ROM-based utility that runs on all operating systems
- The MSA1500 cs Command Line Interface (CLI)—A tool for configuring and managing an MSA1500 cs and its attached storage

**NOTE:** Old versions of ACU and ORCA do not support the MSA20. Before using one of these utilities, upgrade the firmware and drivers on the external sixth-generation Smart Array controller. The latest version of ACU is downloadable from the HP website, <http://www.hp.com>.

For further information about using ACU, or for conceptual information about arrays, logical drives, and fault-tolerance methods, refer to the *HP Array Configuration Utility User Guide*. This document is available on the Documentation CD provided in the MSA20 kit.

For further information about using ORCA, and for a detailed comparison of the features and capabilities of ORCA and ACU, refer to the user guide for the sixth-generation controller to which the MSA20 is connected. This document is available on the Documentation CD that was provided in the controller kit. Alternatively, you can download a copy of the document from the appropriate controller-specific page on the HP website, <http://www.hp.com>.

For further information about using the CLI, refer to the MSA1500 cs documentation at <http://www.hp.com/go/msa1500cs>.

## Replacing Enclosure Components

All components are hot-pluggable. However, removing a component causes a significant change in the airflow within the enclosure, and the enclosure could overheat if a replacement component is not installed within a relatively short time.

- Before removing a component from the enclosure, be sure that a replacement component is immediately available.
- If removing a drive, replace it with another drive or a drive blank to maintain the correct airflow in the enclosure.



**CAUTION:** Be careful when replacing a drive. The drives in the enclosure are fragile.

---

## Replacement Procedures

The following general steps apply to all components. Detailed procedures for removing individual components are given in the appropriate section of this chapter.



**CAUTION:** Before replacing a component, follow the precautions described in Appendix B to minimize the possibility of damage from electrostatic discharge.

---

1. Remove the replacement component from its static-free container.
2. Check the label on the replacement component to be sure that it is of the correct type.
3. Remove the defective component from the enclosure.

4. Install the replacement component in the enclosure.
5. Observe the status LED of the replacement to confirm that the new component is operating properly.
6. Place the defective component in the static-free container for shipment.

## Disk Drive or Drive Blank

### Removing a Drive Blank

Squeeze the release latch and hold it in while pulling the blank out of the enclosure.

### Removing a Disk Drive

1. Press the release button.
2. Pull the drive out of the enclosure by about 3 cm (1 inch) so that it is disconnected from the backplane connector.



**CAUTION:** A drive with a rapidly spinning disk can be difficult to hold securely. To decrease the chance of dropping the drive, do not remove it completely from the enclosure until the disk has stopped rotating. This usually takes a few seconds.

3. When the disk is no longer spinning, remove the drive from the enclosure.

### Installing a Drive Blank

Insert the drive blank into the enclosure, and push it in until it is firmly seated in the enclosure.

### Installing a Replacement Drive



**CAUTION:** Be careful when replacing a drive. The drives in the enclosure are fragile.

1. Pull out the release lever on the drive as far as it can go.

2. Insert the replacement drive into the bay until it can go no further. About 1 cm (0.5 inch) of the drive protrudes from the bay.
3. Push the release lever all the way in. This action installs the drive completely in the bay and seats it firmly against the connector in the enclosure.
4. Observe the drive status LEDs to confirm that the replacement drive is functioning correctly.

## **Fan Assembly**

1. Lift the release lever and pull the fan assembly out of the enclosure.
2. Slide the replacement fan assembly into the enclosure until it is firmly seated in the enclosure.
3. Confirm that the fan starts operating immediately and that the status LED is illuminated green.

## **Power Supply Unit**

1. Disconnect the AC power cord from the defective power supply unit.
2. Squeeze the handle and the release lever together while pulling the defective power supply unit out of the enclosure.
3. Insert the replacement power supply unit into the empty bay until it is firmly seated in the enclosure.
4. Connect the AC power cord.
5. Confirm that the status LED on the replacement unit is illuminated green.

## **Controller Module**

1. Back up the data on the system.
2. Stop data transfers.
3. Disconnect the VHDCI cable.
4. Squeeze the release lever and the finger hook together while pulling the controller module out of the enclosure.

5. Insert the replacement controller module into the enclosure until it is firmly seated in the enclosure.
6. Connect the VHDCI cable to the connector on the new controller module.



**CAUTION:** To prevent damage to the cable connector, do not use excessive force when tightening the thumbscrews on the connector.

7. Confirm that the status LED on the replacement module is illuminated green.

## Battery Packs (in the Controller Module)

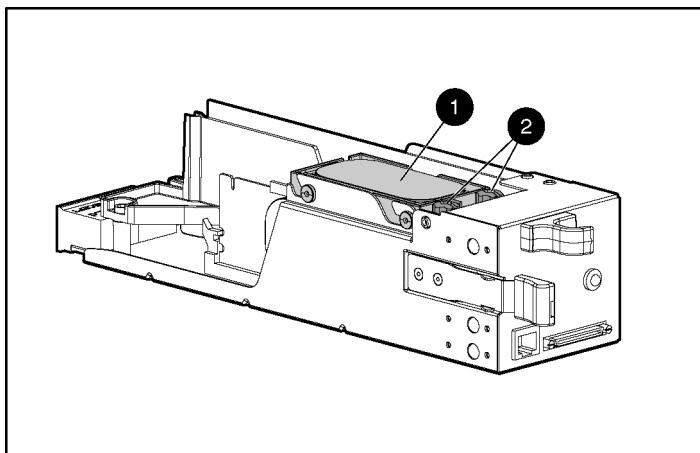


**WARNING:** There is a risk of explosion, fire, or personal injury if battery packs are not properly handled. Refer to the Battery Replacement Notice in Appendix A before installing or removing a battery pack.

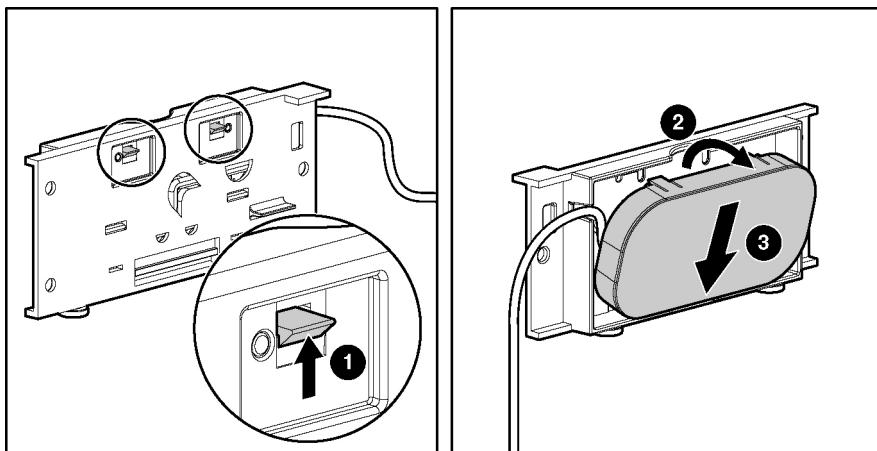
**IMPORTANT:** After installing a new battery pack and replacing the controller module in the enclosure, it may take up to 45 minutes for the battery to recharge and the battery-backed write cache to become fully enabled.

To replace the upper battery pack (1):

1. Remove the controller module from the enclosure (for detailed instructions, refer to the Controller Module section).
2. Loosen the thumbscrews (2).



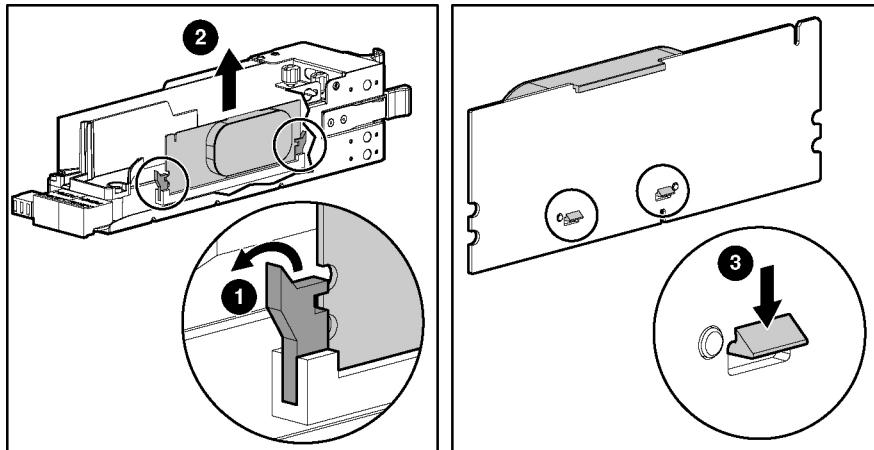
3. Slide the battery unit toward the rear of the controller module and lift it out.
4. On the back of the battery unit, push the two plastic retainer tabs upward through the slots in the battery case (1).
5. Tilt the battery pack slightly away from the battery case (2).
6. Press down on the battery pack to expel it from the battery case (3).



To install the replacement upper battery pack, reverse the previous steps.

To replace the lower battery pack:

1. Remove the upper battery unit. (You do not need to dismantle the upper unit unless you must also replace the upper battery pack.)
2. Remove the cache board.
  - a. Open the ejector levers on each side of the memory module socket (1).
  - b. Pull the cache board out of the socket (2).
3. Push the plastic retainer tabs through to the other side of the cache board (3).



4. Lift the battery pack off the cache board.

To install the replacement lower battery pack, reverse the previous steps.

# A

---

## Regulatory Compliance Notices

### Federal Communications Commission Notice

Part 15 of the Federal Communications Commission (FCC) Rules and Regulations has established Radio Frequency (RF) emission limits to provide an interference-free radio frequency spectrum. Many electronic devices, including computers, generate RF energy incidental to their intended function and are, therefore, covered by these rules. These rules place computers and related peripheral devices into two classes, A and B, depending upon their intended installation. Class A devices are those that may reasonably be expected to be installed in a business or commercial environment. Class B devices are those that may reasonably be expected to be installed in a residential environment (for example, personal computers). The FCC requires devices in both classes to bear a label indicating the interference potential of the device as well as additional operating instructions for the user.

The FCC rating label on the device shows the classification (A or B) of the equipment. Class B devices have an FCC logo or FCC ID on the label. Class A devices do not have an FCC logo or FCC ID on the label. After the class of the device is determined, refer to the corresponding statement in the following sections.

## **Class A Equipment**

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at personal expense.

## **Class B Equipment**

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit that is different from that to which the receiver is connected.
- Consult the dealer or an experienced radio or television technician for help.

## **Declaration of Conformity for Products Marked with the FCC Logo, United States Only**

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

For questions regarding your product, contact us by mail or telephone:

- Hewlett-Packard Company  
P. O. Box 692000, Mail Stop 530113  
Houston, Texas 77269-2000
- 1-800-652-6672 (For continuous quality improvement, calls may be recorded or monitored.)

For questions regarding this FCC declaration, contact us by mail or telephone:

- Hewlett-Packard Company  
P. O. Box 692000, Mail Stop 510101  
Houston, Texas 77269-2000
- 1-281-514-3333

To identify this product, refer to the part, series, or model number found on the product.

## **Modifications**

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by Hewlett-Packard Company may void the user's authority to operate the equipment.

## **Cables**

Connections to this device must be made with shielded cables with metallic RFI/EMI connector hoods in order to maintain compliance with FCC Rules and Regulations.

## **Canadian Notice (Avis Canadien)**

### **Class A Equipment**

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

### **Class B Equipment**

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

## **European Union Notice**

Products with the CE Marking comply with both the EMC Directive (89/336/EEC) and the Low Voltage Directive (73/23/EEC) issued by the Commission of the European Community.

Compliance with these directives implies conformity to the following European Norms (the equivalent international standards are in parentheses):

- EN55022 (CISPR 22) – Electromagnetic Interference
- EN55024 (IEC61000-4-2, 3, 4, 5, 6, 8, 11) – Electromagnetic Immunity
- EN61000-3-2 (IEC61000-3-2) – Power Line Harmonics
- EN61000-3-3 (IEC61000-3-3) – Power Line Flicker
- EN60950 (IEC950) – Product Safety

## Japanese Notice

ご使用になっている装置にVCCIマークが付いていましたら、次の説明文をお読み下さい。

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスB情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。

取扱説明書に従って正しい取り扱いをして下さい。

VCCIマークが付いていない場合には、次の点にご注意下さい。

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスA情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

## Korean Notices

### A급 기기 (업무용 정보통신기기)

이 기기는 업무용으로 전자파적합등록을 한 기기이오니 판매자 또는 사용자는 이 점을 주의하시기 바라며, 만약 잘못판매 또는 구입하였을 때에는 가정용으로 교환하시기 바랍니다.

### B급 기기 (가정용 정보통신기기)

이 기기는 가정용으로 전자파적합등록을 한 기기로서 주거지역에서는 물론 모든지역에서 사용할 수 있습니다.

## BSMI Notice

警告使用者：

這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

## Battery Replacement Notice

The controller cache uses a nickel metal hydride (NiMH) battery pack.



**WARNING: There is a risk of explosion, fire, or personal injury if the battery pack is not properly handled. To reduce this risk:**

- Do not try to recharge the batteries if they are disconnected from the controller.
- Do not expose the battery pack to water, or to temperatures higher than 60°C.
- Do not abuse, disassemble, crush, or puncture the battery pack.
- Do not short the external contacts.
- Replace the battery pack only with the designated HP spare.

**Battery disposal should comply with local regulations. Alternatively, use established parts return methods to return the battery pack to HP for disposal.**



Batteries, battery packs, and accumulators should not be disposed of together with the general household waste. To forward them to recycling or proper disposal, use the public collection system or return them to HP, your authorized HP Partners, or their agents.

For more information about battery replacement or proper disposal, contact your HP authorized reseller or your authorized service provider.

---

## **Electrostatic Discharge**

### **Preventing Electrostatic Damage**

A discharge of static electricity from a finger or other conductor may damage system boards or other static-sensitive devices. This type of damage may reduce the life expectancy of the device.

To prevent electrostatic damage when setting up the system or handling parts:

- Avoid hand contact by transporting and storing products in static-safe containers.
- Keep electrostatic-sensitive parts in their containers until they arrive at static-free workstations.
- Place parts on a grounded surface before removing them from their containers.
- Avoid touching pins, leads, or circuitry.
- Always be properly grounded when touching a static-sensitive component or assembly.

## **Grounding Methods to Prevent Electrostatic Damage**

There are several methods for grounding. Use one or more of the following methods when handling or installing electrostatic-sensitive parts:

- Use a wrist strap connected by a ground cord to a grounded workstation or computer chassis. Wrist straps are flexible straps with a minimum of 1 megohm  $\pm$  10 percent resistance in the ground cords. To provide proper ground, wear the strap snug against the skin.
- Use heel straps, toe straps, or boot straps at standing workstations. Wear the straps on both feet when standing on conductive floors or dissipating floor mats.
- Use conductive field service tools.
- Use a portable field service kit with a folding static-dissipating work mat.

If you do not have any of the suggested equipment for proper grounding, have an authorized reseller install the part.

For more information on static electricity, or assistance with product installation, contact your authorized reseller.

# C

## Specifications

### Physical Specifications

Table C-1: Enclosure Specifications

Form	Dimensions		Weight
	International (cm)	US (in.)	
Unpacked	59.7 x 48.8 x 8.8	23.5 x 19.2 x 3.5	14 kg (32 lb) empty 24 kg (53 lb) with components
In shipping carton	83.8 x 81.3 x 27.4	33.0 x 32.0 x 10.8	25 kg (55 lb) empty 34 kg (75 lb) with components

Table C-2: Specifications of Components

Item	Dimensions		Weight
	International (cm)	US (in.)	
Fan assembly	26.8 x 6.0 x 6.0	10.6 x 2.4 x 2.4	0.50 kg (1.10 lb)
Disk drive (in carrier)	18.5 x 11.0 x 2.6	7.3 x 4.3 x 1.0	0.75 kg (1.65 lb)
Controller module	32.6 x 7.9 x 7.1	12.8 x 3.1 x 2.8	1.4 kg (3.0 lb)
Power supply unit	32.0 x 6.4 x 7.7	12.6 x 2.5 x 3.0	1.80 kg (3.96 lb)

## Power Specifications

**Table C-3: AC Input Requirements**

	Nominal Value	Range
Frequency ( $\pm 5\%$ )	50 or 60 Hz	47 to 63 Hz
Voltage	110 or 240 V	90 to 254 V RMS (autoranging)
Steady state maximum current	At 240 V: 1.8 A (one power supply) or 1.9 A (two power supplies)  At 120 V: 3.7 A (one power supply) or 3.9 A (two power supplies)	—
Standby current	0.21 A at 240 V, 60 Hz  0.15 A at 120 V, 60 Hz	—

## Environmental Specifications

**Table C-4: Environmental Specifications**

	Operating	Shipping or Storage
Ambient temperature	10° to 35°C (50° to 95°F), with an average change of less than 1°C per hour and a step change of less than 3°C per hour	-40° to 66°C  -40° to 150°F
Relative humidity (noncondensing)	40% to 60%, with a step change of less than 10%	10% to 80%
Air quality	Fewer than 500,000 particles 0.5 micron or larger per cubic foot (approximately 17,700 per liter)	—
Heat dissipation	1175 BTU/hr (345 W)	—

---

# **Index**

## **A**

ACU (Array Configuration Utility) 4-1  
air quality C-2  
ambient temperature C-2  
array, configuring 4-1  
authorized reseller x

## **B**

batteries  
recycling A-6  
replacing 5-4  
bay numbers 2-1

## **C**

cables, FCC compliance statement for A-3  
cache features 1-1  
components, specifications of C-1  
configuring an array 4-1  
controller module  
description of 2-4  
location of 2-2  
replacing 5-3  
specifications of C-1

## **D**

Declaration of Conformity A-3  
dimensions  
of components C-1  
of enclosure C-1  
disk drive  
description of 2-5  
replacing 5-2  
specifications of C-1  
drive blank  
description of 2-5  
replacing 5-2  
drive carrier, description of 2-5  
drive status LEDs 2-6

## **E**

electrostatic damage, preventing B-1  
enclosure  
dimensions of C-1  
installing 3-1  
mounting in a rack 3-2  
moving while in rack 3-6  
operating environment C-2  
rack space required for 3-2  
specifications of C-1  
storage conditions for C-2  
weight of 3-2, C-1  
environmental requirements C-2

**F**

fan assembly  
description of 2-7  
location of 2-2  
replacing 5-3  
specifications of C-1  
fault-tolerance levels allowed 1-1  
FCC (Federal Communications  
Commission) notices A-1

**G**

grounding methods B-2

**H**

hard drive LEDs, interpreting 2-6  
heat dissipation C-2  
HP website x  
humidity of environment C-2

**L**

LEDs on hard drive 2-6

**O**

operating environment C-2  
ORCA (Option ROM Configuration for  
Arrays) 4-1

**P**

particulate matter in air C-2

power input and output specifications C-2  
power supply unit  
description of 2-3  
location of 2-2  
replacing 5-3  
specifications of C-1

**R**

RAID levels allowed 1-1  
redundancy features 1-1  
regulatory compliance notices A-1  
relative humidity C-2

**S**

safety features 1-1  
shipping bracket, location and use of 3-6  
storing the enclosure C-2  
symbols in text ix  
symbols on equipment vii

**T**

technical support ix  
temperature during normal operation C-2  
thermal specifications C-2

**W**

website, HP x  
weight  
of components C-1  
of enclosure C-1